ENGINEERING
PROTO-FEDERATION

HIGH LEVEL ARCHITECTURE

The "EVALUATORS"

# High Level Architectu
# and the
# Engineering
# Protofederation

**Dana Paterson**
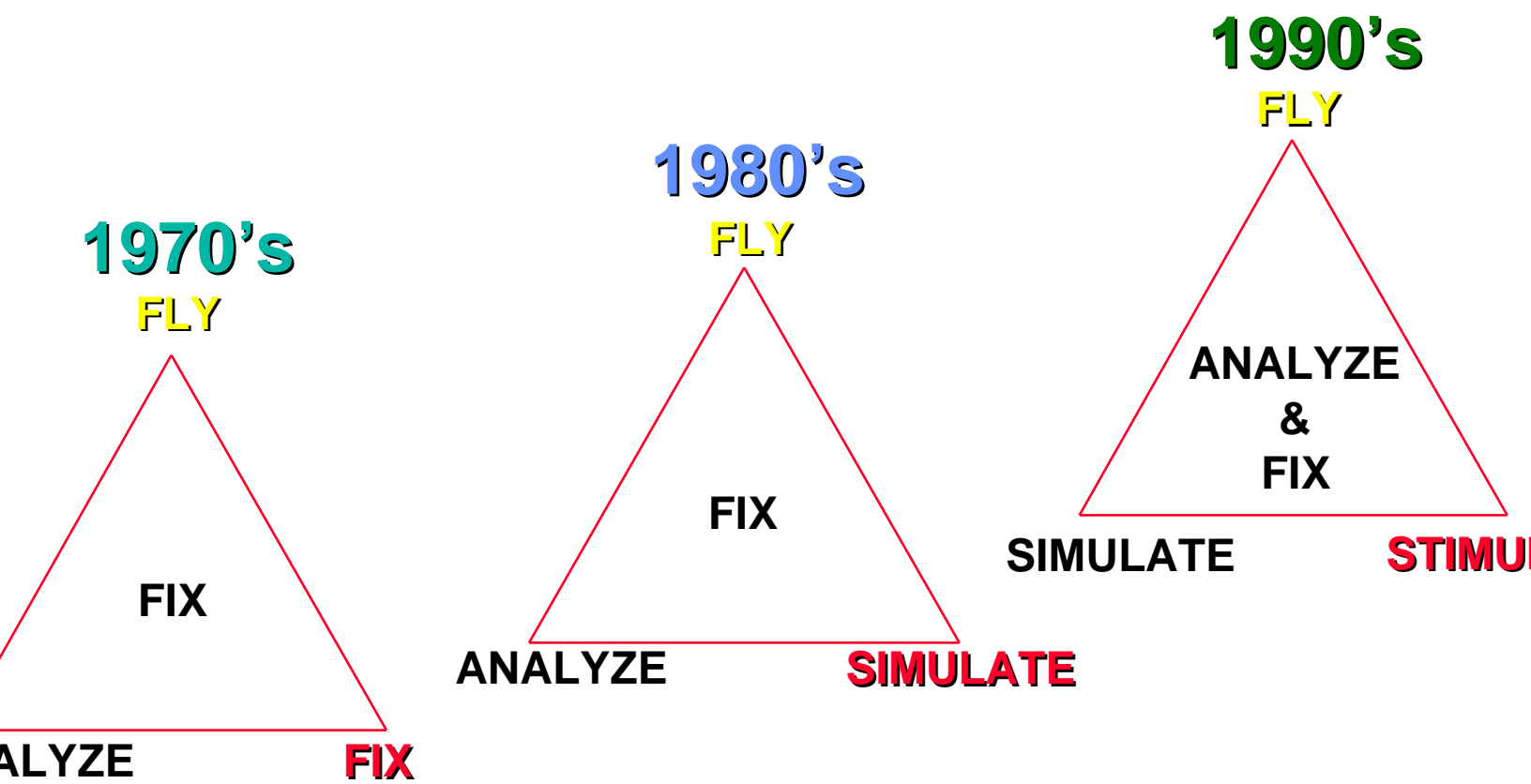**NAWC-AD**
**Patuxent River, M**

# Global Objective

- Evaluate the High Level Architecture's suitablity for support of detailed, high-fidelity models and distributed simulations in the context of a realistic engineering situation

# T&E METHODOLOGY

## THE EVOLUTION OF T&E METHODOLOGY

**1990's**

FLY

ANALYZE
&
FIX

SIMULATE        STIMUL

**1980's**

FLY

FIX

ANALYZE        SIMULATE

**1970's**

FLY

FIX

ALYZE        FIX

# Testing Issues

- **Realistic system under test loading**
- **Realistic "test" C4I Architectures/ Loading**
- **Realistic/varied background**
- **"Coherent" Scenarios**
- **Integration of Missile Warning and Countermeasures**

- **IR and Semi-active Missile Seeker end game testing.**
- **Highly dynamic scenarios**
- **Numbers/types of targets**
- **Coordination of Surveillance Assets**
- **Training/Calibration of Knowledge Based Algorithms vs testing**

# HLA Is...

- ## Run Time Infrastructure (RTI) Interface Specification
  - **FEDERATION MANAGEMENT SERVICES**
  - **DECLARATION MANAGEMENT SERVICES**
  - **OBJECT MANAGEMENT SERVICES**
  - **OWNERSHIP MANAGEMENT SERVICES**
  - **TIME MANAGEMENT SERVICES**

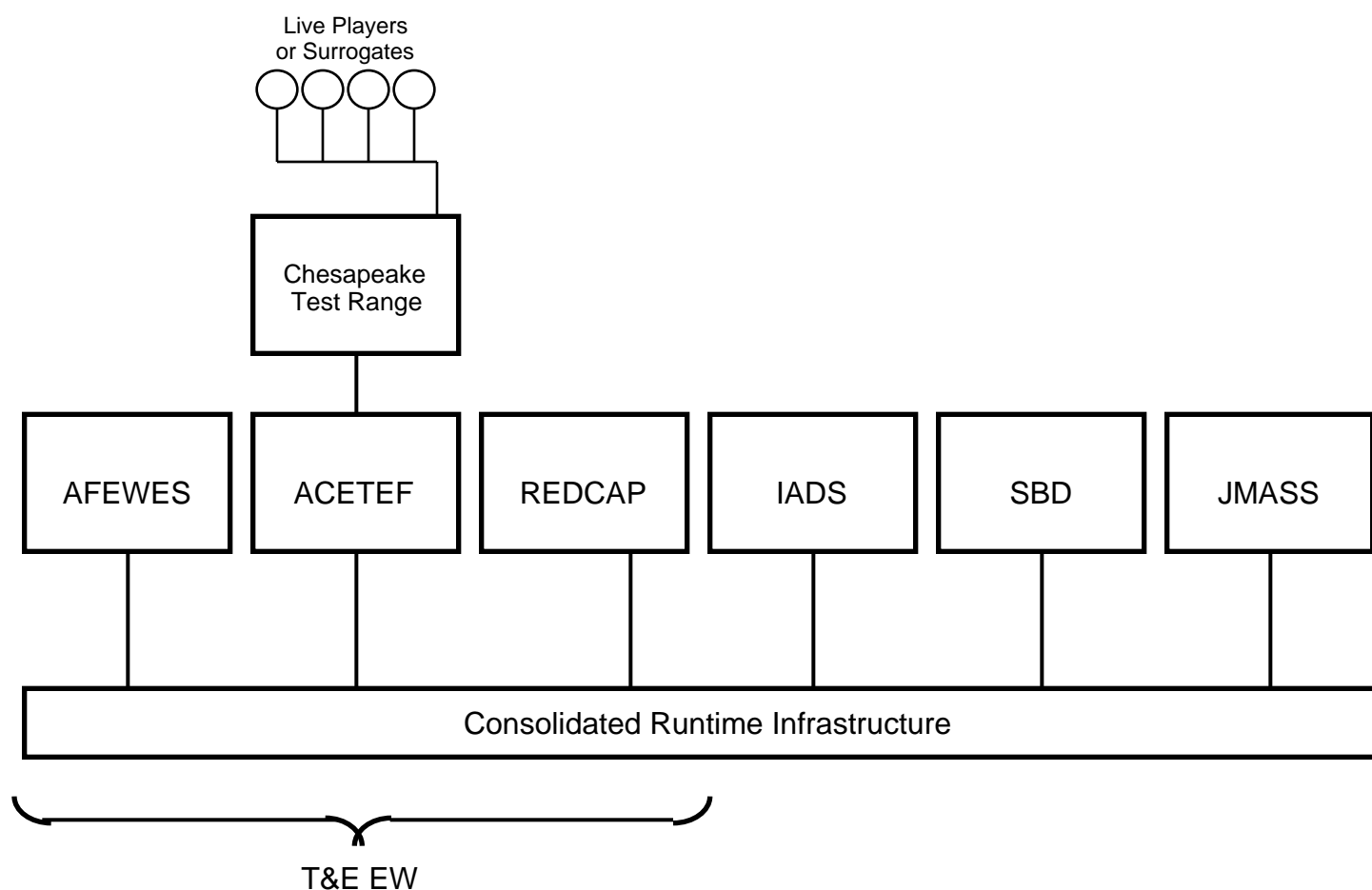- ## Object Model Template (OMT)
  - **A MANDATORY NOTATION FOR DESCRIBING THE "PUBLIC" ASPECTS OF A SIMULATION**
  - **FACILITATES RAPID EVALUATION OF FEDERATION CANDIDATES**
  - **FACILITATES THE FEDERATION OF SIMULATIONS**
  - **IF OBJECT-BASED TECHNOLOGY IS USED, THE OMT FACILITATES THE STRUCTURING OF DATA TRANSFERS**

- ## Rules
  - **A SET OF RULES WHICH MUST BE FOLLOWED IN DEVELOPMENT PHASE TO ACHIEVE PROPER INTERACTION OF SIMULATIONS IN EXECUTION PHASE. THESE DESCRIBE THE RESPONSIBILITIES OF SIMULATIONS AND OF THE RUNTIME INFRASTRUCTURE IN HLA FEDERATIONS.**
  - **EXAMPLE RULE:** *DURING A FEDERATION EXECUTION, AN ATTRIBUTE OF AN INSTANCE OF AN OBJECT CAN BE OWNED BY ONLY ONE FEDERATE AT ANY GIVEN TIME.*
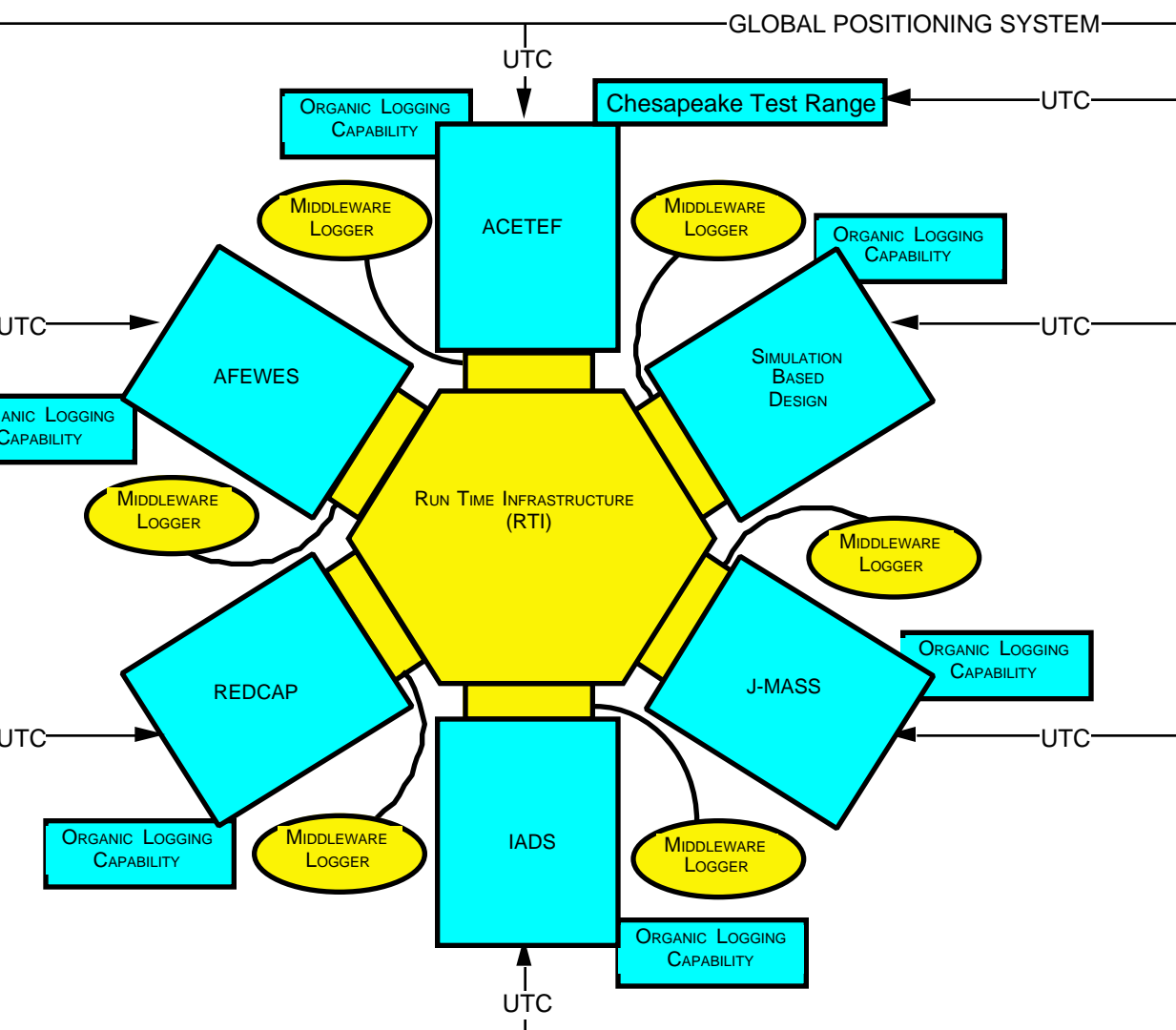
# Engineering Protofederation

Live Players
or Surrogates
○ ○ ○ ○

Chesapeake
Test Range

| AFEWES | ACETEF | REDCAP | IADS | SBD | JMASS |

Consolidated Runtime Infrastructure

T&E EW

# The Engineering Protofederation "T&E Suitability Facility" for Evaluation of HLA

GLOBAL POSITIONING SYSTEM

UTC

ORGANIC LOGGING CAPABILITY

Chesapeake Test Range — UTC

MIDDLEWARE LOGGER

ACETEF

MIDDLEWARE LOGGER

ORGANIC LOGGING CAPABILITY

AFEWES

SIMULATION BASED DESIGN

UTC — UTC

ORGANIC LOGGING CAPABILITY

MIDDLEWARE LOGGER

RUN TIME INFRASTRUCTURE (RTI)

MIDDLEWARE LOGGER

REDCAP

J-MASS

ORGANIC LOGGING CAPABILITY

UTC — UTC

ORGANIC LOGGING CAPABILITY

MIDDLEWARE LOGGER

IADS

MIDDLEWARE LOGGER

ORGANIC LOGGING CAPABILITY

UTC

- **High-Impedance Middleware Service Call Logger**

- **Time Synchronized**

- **Manned by T&E Engineers**

# RTI Services Used

CREATE FEDERATION EXECUTION.

DESTROY FEDERATION EXECUTION

JOIN FEDERATION EXECUTION

RESIGN FEDERATION EXECUTION

PUBLISH OBJECT CLASS

PUBLISH INTERACTION CLASS

SUBSCRIBE OBJECT CLASS  ATTRIBUTE

SUBSCRIBE INTERACTION

CONTROL UPDATES

REQUEST ID

REGISTER OBJECT

UPDATE ATTRIBUTE VALUES

DISCOVER OBJECT

REFLECT ATTRIBUTE VALUES

SEND INTERACTION

RECEIVE INTERACTION

DELETE OBJECT

REMOVE OBJECT

REQUEST ATTRIBUTE OWNERSHIP DIVESTITURE.

REQUEST ATTRIBUTE OWNERSHIP ASSUMPTION

ATTRIBUTE OWNERSHIP DIVESTITURE NOTIFICATION

ATTRIBUTE OWNERSHIP ACQUISITION NOTIFICATION

REQUEST ATTRIBUTE OWNERSHIP ACQUISITION

REQUEST ATTRIBUTE OWNERSHIP RELEASE